

Appl. No. 10/709,212
Amdt. Dated 11-06-2006
Reply to Office Action Mailed 08-08-2006

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REMARKS

Claims 1-39 are pending in the present application. Claims 1-8 are rejected under 35 U.S.C. §102(e), as being anticipated by U.S. Patent No. 6,476,609 (Bittar). Claim 9 is rejected under 35 U.S.C. §103 as being unpatentable over Bittar in view of U.S. Patent No. 6,304,086 (Minerbo). Applicants respectfully traverse each of these claim rejections.

Applicants appreciate the Examiner's indication that claims 10-39 would be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims. Applicants believe, however, that the base claim (*e.g.*, claim 1) is patentable over the cited references and, thus, no amendment of claims 10-39 is required.

Regarding the rejection of independent claim 1, Applicants submit that Bittar does not teach or suggest, among other steps, the step of:

while the logging instrument is rotating, directionally measuring the first voltage signals associated with the transmitted electromagnetic energy using the first receiver antenna, as a function of the azimuthal orientation of the logging instrument, so as to determine the azimuthal variation of the measured first voltage signals
(emphasis added).

The Bittar reference also does not teach or suggest the subsequent step of:

fitting the azimuthal variation of the measured first voltage signals to approximate functions.

The Office Action refers to portions of column 9-12 of the Bittar reference as basis for the §102(e) rejection and, in particular, as disclosing the "directional measuring" and "fitting" steps provided above. The description provided in these portions do not, however, teach or suggest directionally measuring the measured first voltage signals, while the logging instrument is rotating, *as a function of azimuthal orientation* and further, *determining the azimuthal*

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variation of the measured first signals. The computations described in the cited portions appear to take into account the tilt angle of the transmitter and receiver antennae. As briefly described in the Background of the Invention of the present application, the method of determining the bedding response of a logging tool that is taught by this Bittar reference relies on computing the difference or the ratio of the phase-based or amplitude-base responses of the receiver antennae which are mounted in planes that are not parallel to the planes of the transmitter antennae. The bedding response is described through the difference or ratio of signals at two different orientations (tilt angles of the receiver and transmitter). Although this method considers the tilted angles of the transmitter and receiver, it is not concerned with detail azimuthal responses of the measured signal. Thus, the Bittar reference fails to teach or suggest (1) directionally measuring the first voltage signals as a function of azimuthal orientation or (2) determining the azimuthal variation of the measured signals.

It follows then that this reference also does not teach or suggest the further step of "fitting the azimuthal variation of the measured first voltage signal" as recited in claim 1. Portions of columns 11 and 12 are cited in the Office Action as disclosing this step. The description in these portions refers, however, to a method of computing resistivities (see diagram of FIG. 8) that involves varying (and optimizing) horizontal conductivity, vertical conductivity, and θ , the relative dip angle. The method does not appear to involve fitting any azimuthal variation of measured voltage signals.

None of the other cited references teaches or suggests the missing "directionally measuring" and "fitting" steps of claim 1. The Bittar reference cannot be combined with any of the cited references to produce a method of for characterizing a subsurface formation having each and every element of claim 1. The invention of claim 1 is, therefore, not obvious in view of Bittar individually or in combination with any other cited reference(s).

Accordingly, independent claim 1 and dependent claims 2-8 are patentable over the cited reference(s). Withdrawal of the rejection of claims 1-8 is respectfully requested. Claim 9 depends from claim 1 and is, therefore, patentable for the same reasons set forth above in respect to claim 1. Withdrawal of the rejection of claim 9 is also respectfully requested.

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In view of the foregoing, the claims pending in the application are believed to be in condition for allowance. The Examiner is respectfully requested to pass the application to issue.

No fee is believed to be due at this time. If the appropriate Petition for an Extension of Time is not attached hereto (or any other Petition required of the application), this statement shall serve as Applicants' Petition to the U.S.P.T.O. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments related to this Response to Deposit Account No. 190610 (19.0405), maintained by Schlumberger Technology Corporation.

The undersigned is available for consultation at any time, if the Examiner believes such consultation may expedite the resolution of any issues.

Respectfully submitted,

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